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B7B BSBCC

(56) Documents Cited

GB 2316043 A GB 2314051 A

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UK CL (Edition R ) B7B BSBCC

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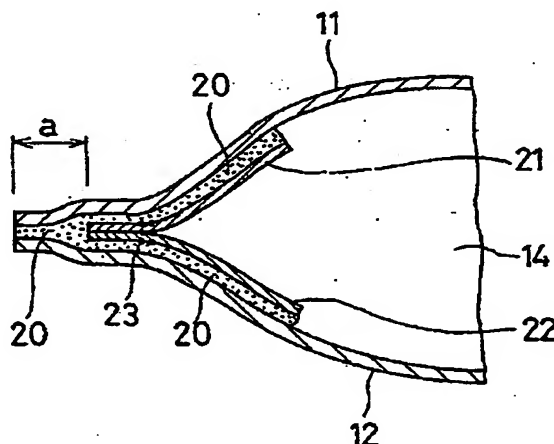
Online: WPI, EPODOC, JAPIO

(54) Abstract Title

**An airbag having gas leak preventing joints**

(57) An airbag (10) comprises a first main panel (11) and a second main panel (12) which are joined to each other along their peripheral edges to form an envelope-like configuration. A first inner panel (21) is bonded, using adhesive (20), to the first main panel (11) over the entire surface of the first inner panel (21) and a second inner panel (22) is bonded to the second main panel (12) over the entire surface of the second inner panel (22). The first and second inner panels (21, 22) are bonded to the first and second main panels (11, 12) through the joint between the first and second main panels (11, 12) around the peripheral edges of the first and second main panel (11, 12).

Fig 2



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FIG 1

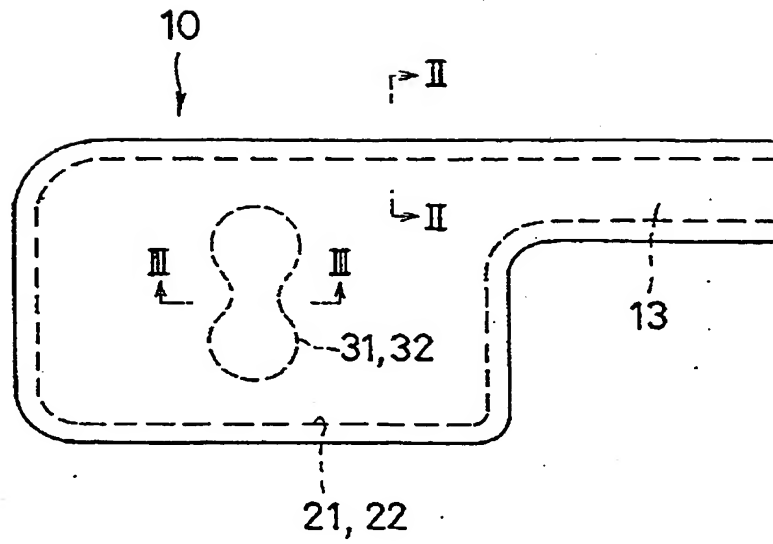


FIG 2

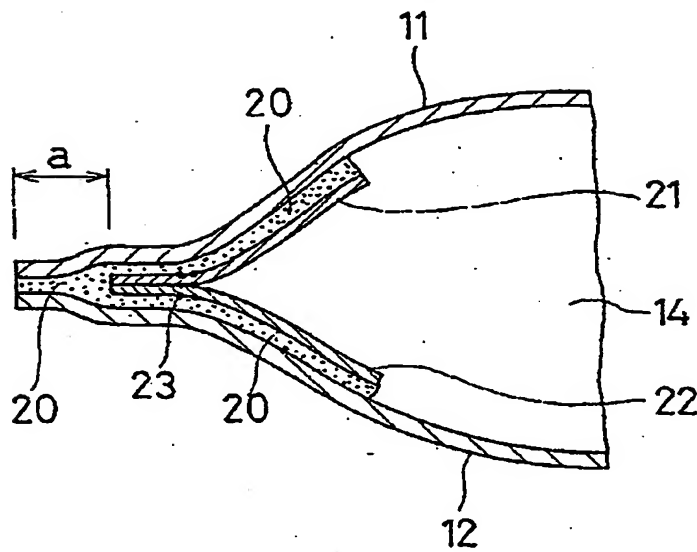
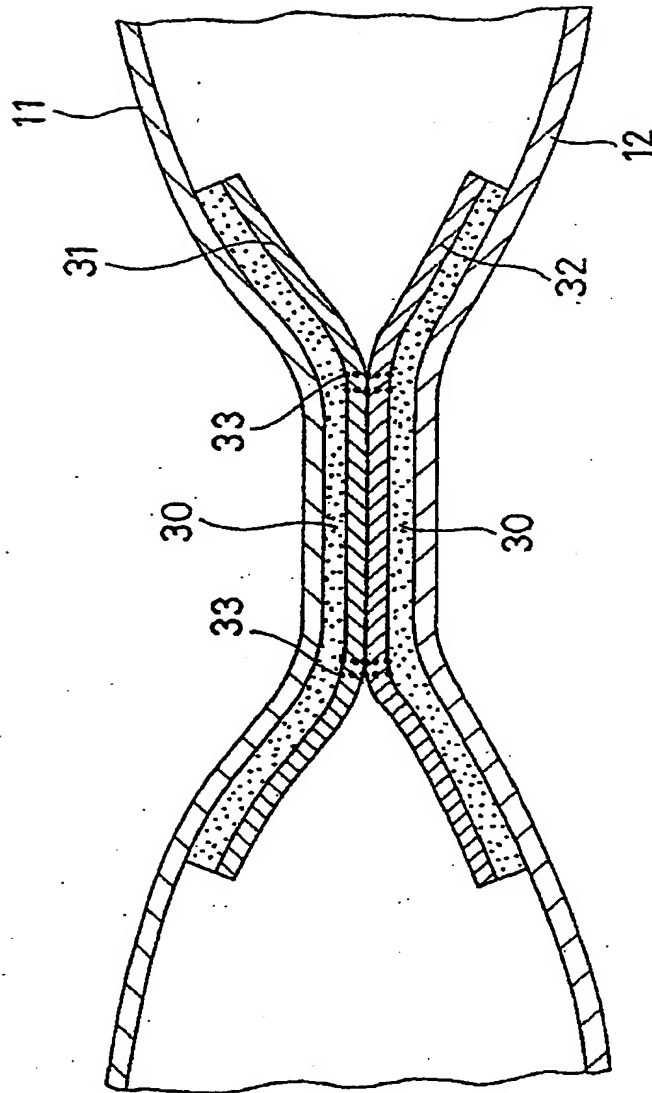
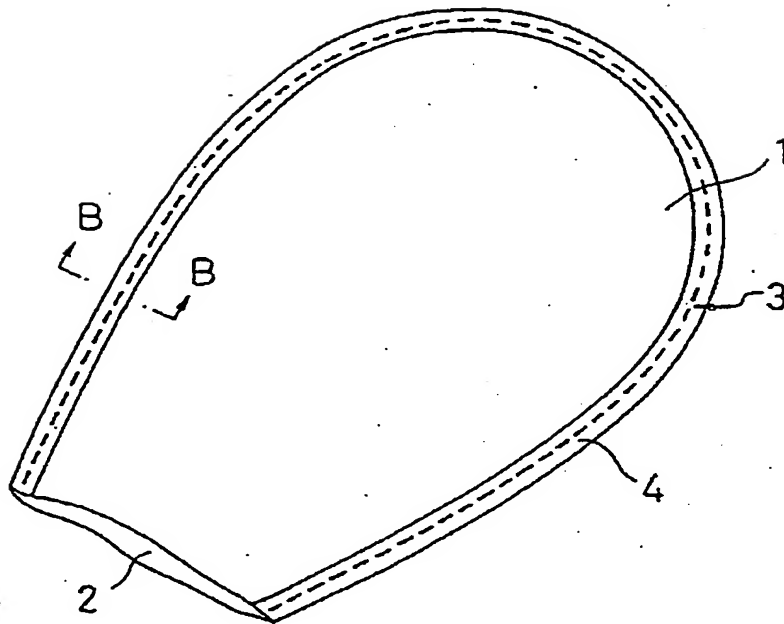


Fig 3

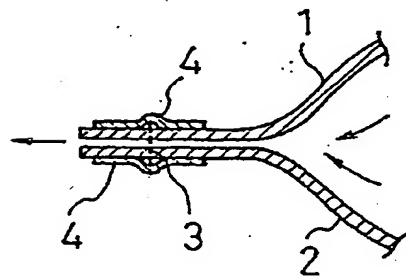


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FIG 4

(a)



(b)



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## AIRBAG

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The present invention relates to an airbag for an airbag device which is installed in vehicles such as automobiles and aircraft and, more particularly, to an airbag which is prevented from gas leakage at a joint of panels.

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Conventionally, an airbag comprising a plurality of panels which are sewn together to form an envelope-like configuration has been employed as a driver's airbag, a front passenger's airbag, a rear passenger's airbag, or a side airbag installed in an automobile, or an airbag installed in an aircraft. The airbag is inflated with gas from an inflator.

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Airbags, such as a side airbag for protecting an occupant's head (curtain-type airbag) and a side airbag for protecting an occupant during roll-over, of which the inner pressure should be kept in high degree for a long period, are required to highly prevent gas leakage at a sewn portion. When the airbag is inflated, weaving yarns may be strongly pulled by a sewing yarn so as to widen interstices (make holes) along the sewing

yarn (seem) penetrating the panels. The holes allow gas leakage.

To prevent the gas leakage from the sewn portion of the panels, conventionally, as shown in Figs. 4(a) and 4(b), silicone tapes 4 are attached to cover the sewn portion 3 of the panels 1, 2 along the peripheral edges thereof.

In the conventional airbag shown in Figs. 4(a), 4(b), when the gas pressure in the airbag is high, as shown in Fig. 4(b), gas may leak from a space between the panels 1, 2.

The object of the present invention is to provide an airbag which can securely prevent the gas leakage at a joint of panels and has a quite high bonding strength between the panels.

An airbag of the present invention comprises a first main panel and a second main panel which are joined to each other at a joint to form a chamber defined by the first and second main panels and the joint, the airbag being inflatable when gas is supplied into the chamber, the airbag being characterized by comprising a first inner panel and a second inner panel interposed between the main panels over the joint, wherein the first inner panel is bonded to the first main panel and the second inner panel is bonded to the second main panel; and wherein the first inner panel and the second inner panel are joined to each other at a position apart from the inner edge of the

chamber.

According to the airbag, since no sewing yarn penetrates the main panels, there is no possibility of widening interstices (making holes) of the main panels. This means  
5 that gas leakage through the holes does not occur.

In the present invention, since the first inner panel is bonded to the first main panel and the second inner panel is bonded to the second main panel, the bonding strength between each inner panel and the corresponding main panel is sufficiently high.  
10 The each inner panel is bonded to the corresponding main panel over the entire surface of the inner panel, thereby making the bonding strength significantly high.

The inner panels may be joined strongly to each other, for example, by sewing. The first inner panel and the second inner panel may be formed by folding a piece of  
15 panel. Also in this case, the strength between the first inner panel and the second inner panel is significantly high.

As apparent from the above, the present invention can provide the airbag having significantly high bonding strength between the main panels.  
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In case where the peripheral portions of the main panels are joined to each other, it is preferable that the inner panels are positioned apart from the peripheral edges of the main panels by a predetermined distance and the main panels are bonded to each other between the inner panels and the outer edges of the main panels. Even

when the gas pressure in the airbag is high, the gas leakage through a space between the first main panel and the second main panel can be prevented.

5 In the present invention, the first main panel and the second main panel may be joined to each other not only along the peripheries of said main panels but also about the center of the chamber. At the joint about the center of the chamber, two inner panels may be used as inner panels and may be preferably joined to each other by sewing.

10 Hereinafter, an embodiment of the present invention will be described with reference to attached drawings. Fig. 1 is a side view of an airbag according to the embodiment, Figs. 2, 3 are sectional views taken along lines II-II and III-III of Fig. 1, Fig. 4(a) is a perspective view showing a conventional airbag and Fig. 4(b) is an enlarged view showing a section along a line B-B of Fig. 4(a).

15 The shown airbag is a side airbag for protecting the head of an automobile occupant. The airbag 10 comprises a first main panel 11 and a second main panel 12 which are joined to each other along their peripheral edges and about the center to form an envelope-like configuration and is inflated with gas introduced into a chamber 14 through a gas inlet 13 from an inflator (not shown).

20 As shown in Fig. 2, interposed between the peripheral portions of the main panels 11, 12 are a first inner panel 21 and a second inner panel 22. These inner panels 21, 22 are strips extending along the peripheral portions and are joined to each



other along the outer edges by sewing. Numeral 23 designates a sewing yarn (seam).

5 The sewn inner panels 21, 22 are positioned apart from the peripheral edges of the main panels 11, 12 by a predetermined distance  $a$ . By adhesives 20, the first inner panel 21 is bonded to the first main panel 11 over the entire surface of the first inner panel 21 and the second inner panel 22 is bonded to the second main panel 12 over the entire surface of the second inner panel 22. The main panels 11, 12 are also bonded to each other outside the inner panels 21, 22. The aforementioned distance  $a$  is preferable less than 100 mm, preferably from 5 mm to 15 mm.

10 As shown in Fig. 3, about the center of the airbag 10, by adhesives 30, an inner panel 31 is bonded to the first main panel 11 over the entire surface of the inner panel 31 and an inner panel 32 is bonded to the second main panel 12 over the entire surface of the second inner panel 32. The inner panels 31, 32 are sewn to each other by a sewing yarn 33. The sewing yarn 33 is positioned apart from the peripheral edges of the inner panels 31, 32.

15 Employed as the adhesives may be silicone adhesives, urethane adhesives, epoxy adhesives, or other adhesives.

20 The airbag as mentioned above is inflated by the introduction of gas through the gas inlet 13.

At the joints between the main panels 11, 12, gas pressures act to separate the

main panels 11, 12 from each other at both the peripheral portion and the central portion of the airbag. However, since the inner panels 21, 22 are bonded to the main panels 11, 12 over the entire surfaces of the inner panels 21, 22, respectively, the inner panels 31, 32 are also bonded to the main panels 11, 12 over the entire surface of the inner panels 31, 32, respectively, the inner panels 21, 22 are sewn to each other, and the inner panels 31, 32 are sewn to each other, the main panels 11, 12 are kept to be strongly joined to each other even when the gas pressure in the chamber 14 is high.

At the peripheral portion of the airbag 10, the main panels 11, 12 are bonded directly to each other outside the inner panels 21, 22 by the adhesives 20, no gas leakage may be occurred between the main panels 11, 12. The stitches are formed only in the inner panels 21, 22 and 31, 32 by the sewing yarns 23 and 33, respectively, so that the stitches are not formed in the main panels 11, 12 at all. Therefore, even when the airbag is inflated, there is no possibility of widening interstices (making holes) of the main panels 11, 12 by the sewing yarns 23, 33. This means that gas leakage through the holes does not occur.

To manufacture the airbag of the present invention, first the inner panels 21, 22 are sewn together by the sewing yarn 23 and the inner panels 31, 32 are sewn together by the sewing yarn 33. After the adhesives are applied to the peripheral portion and the central portion of the main panel 12, the inner panels 21, 22 and the inner panels 31, 32 are put on the adhesive areas on the main panel 12. The main panel 11, which the adhesives are applied to the peripheral portion and the central portion thereof, is put on them to cover them. The main panels 11, 12 and the inner

panels 21, 22, 31, 32 therebetween are bonded with pressure by pressing the main panels 11, 12 against each other from the outside. This process is an example of the manufacturing process of the airbag of this invention. The airbag 10 can be manufactured according to another process. To improve the bonding strength, a primer treatment may be employed if necessary.

Employed as the main panels 11, 12 may be resin-coated fabrics or resin sheets. Employed as the inner panels 21, 22, 31, 32 may be fabrics or resin sheets. When the inner panels are resin sheets, the joint of them is preferably made by adhesives not by sewing. Alternatively, the inner panels may be integrally formed.

Though the airbag shown in Figs. 1 through 3 is a side airbag for an automobile, the present invention may be applied to automotive airbags such as a driver's airbag, a front passenger's airbag, a rear passenger's airbag and airbags for an aircraft.

As described above, the present invention can provide an airbag which securely prevent gas leakage at a joint of panels and which has high bonding strength between the panels.

### Claims

5           1    An airbag comprising a first main panel and a second main panel which are joined to each other at a joint to form a chamber defined by said first and second main panels and said joint, said airbag being inflatable when gas is supplied into said chamber, said airbag being characterized by comprising

              a first inner panel and a second inner panel interposed between said main panels over said joint,

10            wherein said first inner panel is bonded to said first main panel and said second inner panel is bonded to said second main panel; and

              wherein said first inner panel and said second inner panel are joined to each other at a position apart from the inner edge of said chamber.

              2    An airbag as claimed in claim 1, wherein said first inner panel is bonded to said first main panel over the entire surface of said first inner panel and said second inner panel is bonded to said second main panel over the entire surface of said second inner panel.

              3    An airbag as claimed in claim 1 or 2, wherein said first inner panel and said second inner panel are joined to each other by sewing.

20            4    An airbag as claimed in any one of claims 1 through 3, wherein said joint of said first main panel and said second main panel extends along the peripheral edges of said main panels,

              said first inner panel and said second inner panel are strips extending along said joint and are positioned apart from the outer edges of said main panels, and

said main panels are bonded to each other between said inner panels and the outer edges of said main panels.

5        An airbag as claimed in any one of claims 1 through 4, wherein said first main panel and said second main panel are joined to each other along the peripheries of said main panels and about the center of said chamber.

6        An airbag substantially as described herein with reference to and as shown in Figures 1 to 3 of the drawings.

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Application No: GB 9926996.1  
Claims searched: 1 - 6

Examiner: Peter Macey  
Date of search: 10 February 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): B7B (BSBCC)

Int Cl (Ed.7): B60R 21/16

Other: Online: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2316043 A (BRIDGESTONE) see figure 2a	1, 2
X	GB 2314051 A (BRIDGESTONE) see figure 1c	1, 2

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X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.